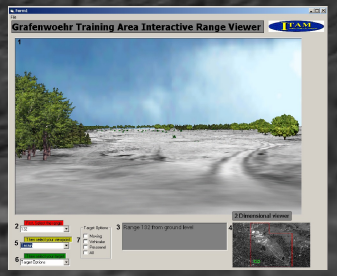
# USAREUR Range Viewshed Analysis and 3D Visualization

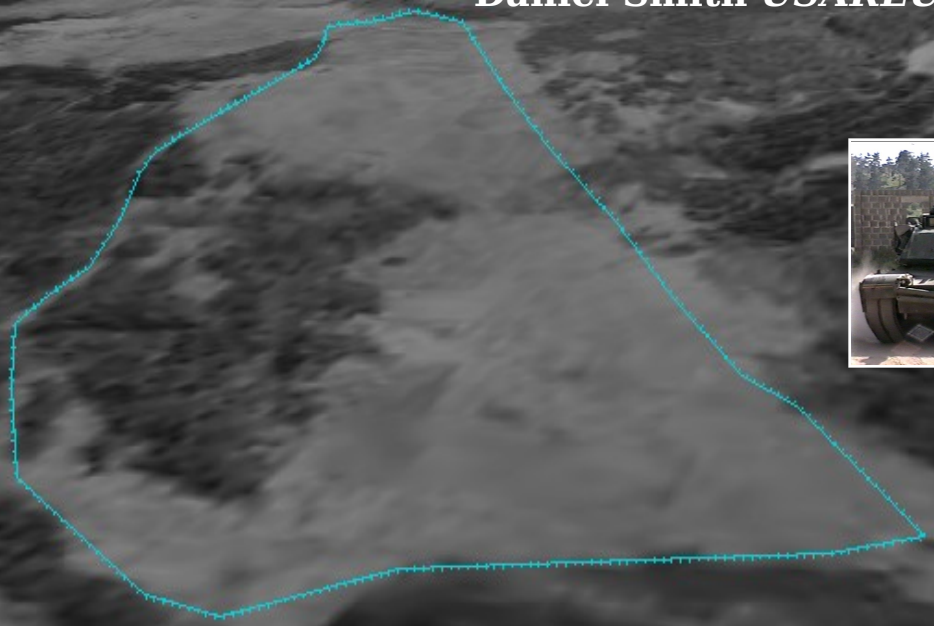
## *Grafenwöhr Training Area, Germany*

**Presented by: Bethany Hodge, *Pangaea Information Technologies, Ltd.***

**Steven Shumaker *Pangaea Information Technologies, Ltd.***

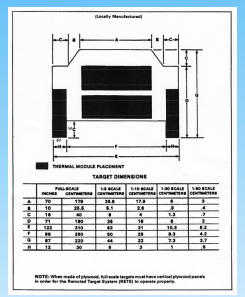
**Daniel Smith *USAREUR, 7th ATC***

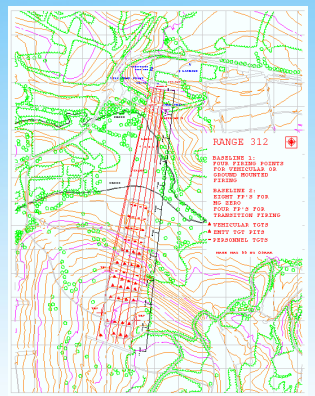


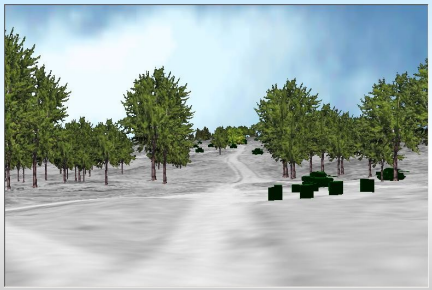


# Presentation Overview

- **Project Description**
  - 3D Visualization of Ranges
- **Project Outline**
  - Task Descriptions
- **Lessons Learned**
- **Summary**



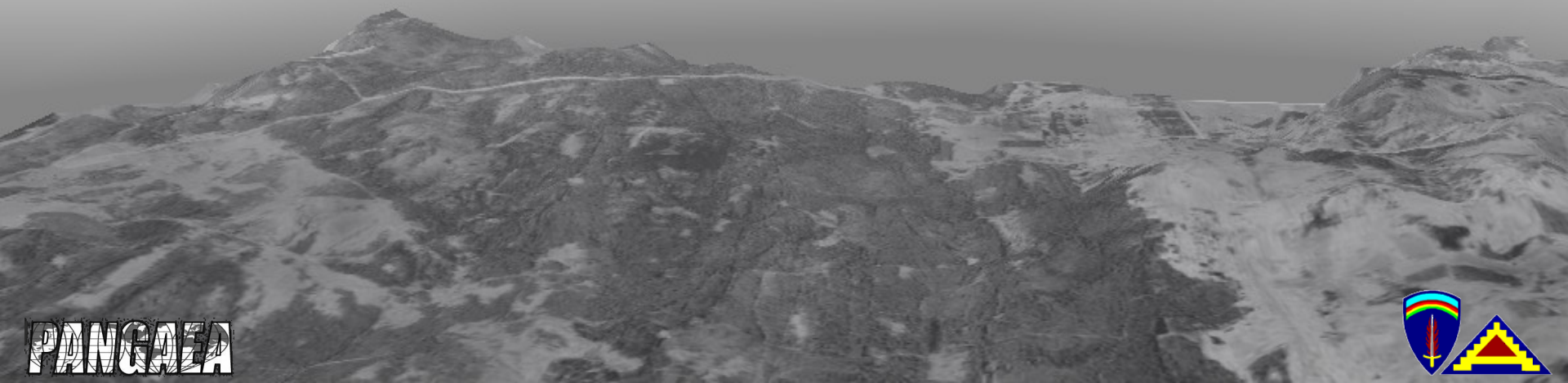


# Project Description

**Development of a customized Visual Basic based application for Grafenwöhr Training Area firing ranges**

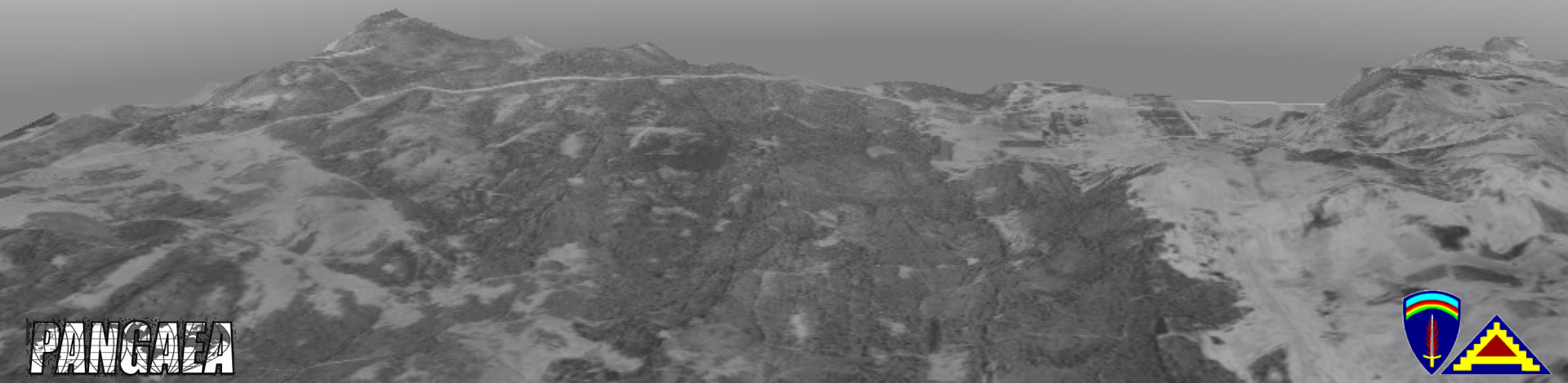
- **3D visualization of each range**
  - **Viewshed analysis**
  - **Familiarizes troops with ranges**



# 3D Visualization of Ranges

**Commanders and Range Managers conduct viewshed analysis for ranges**

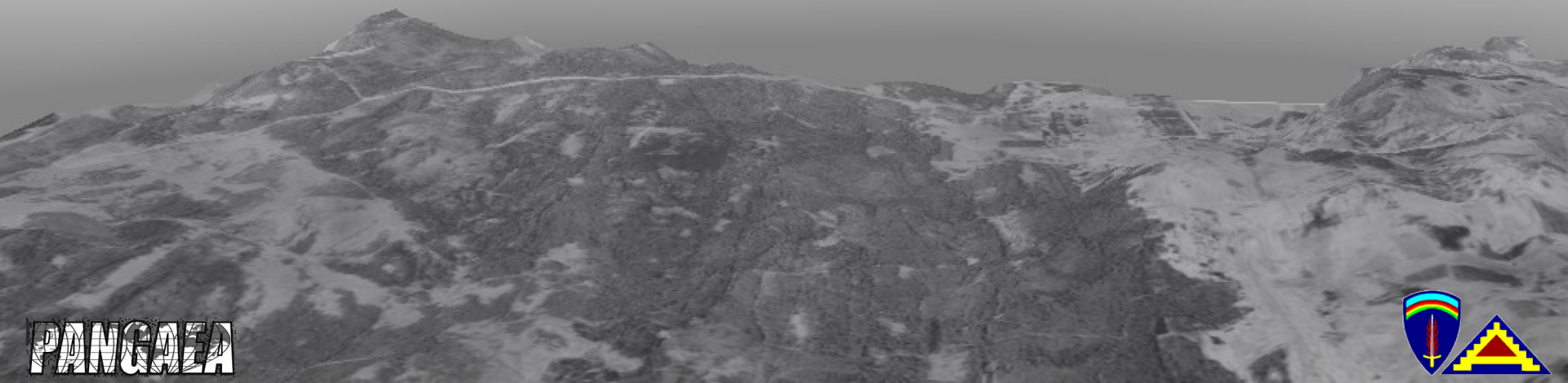
- **Determine the suitability of each range**
- **Visualize alterations to the layout of the firing ranges**



# 3D Visualization of Ranges

**Users may familiarize themselves with the various ranges at Grafenwöhr**

- **Minimal adjustment period**
- **Increased training efficiency**



# Project Outline

- **Task 1: Data Acquisition and Preparation**
- **Task 2: Creation of Virtual Training Range Environments and Line of Sight Targeting Options**
- **Task 3: Creation of Visual Basic Based Application**
- **Task 4: Report Preparation/User Manual**

# Task 1: Data Acquisition and Preparation

- Id
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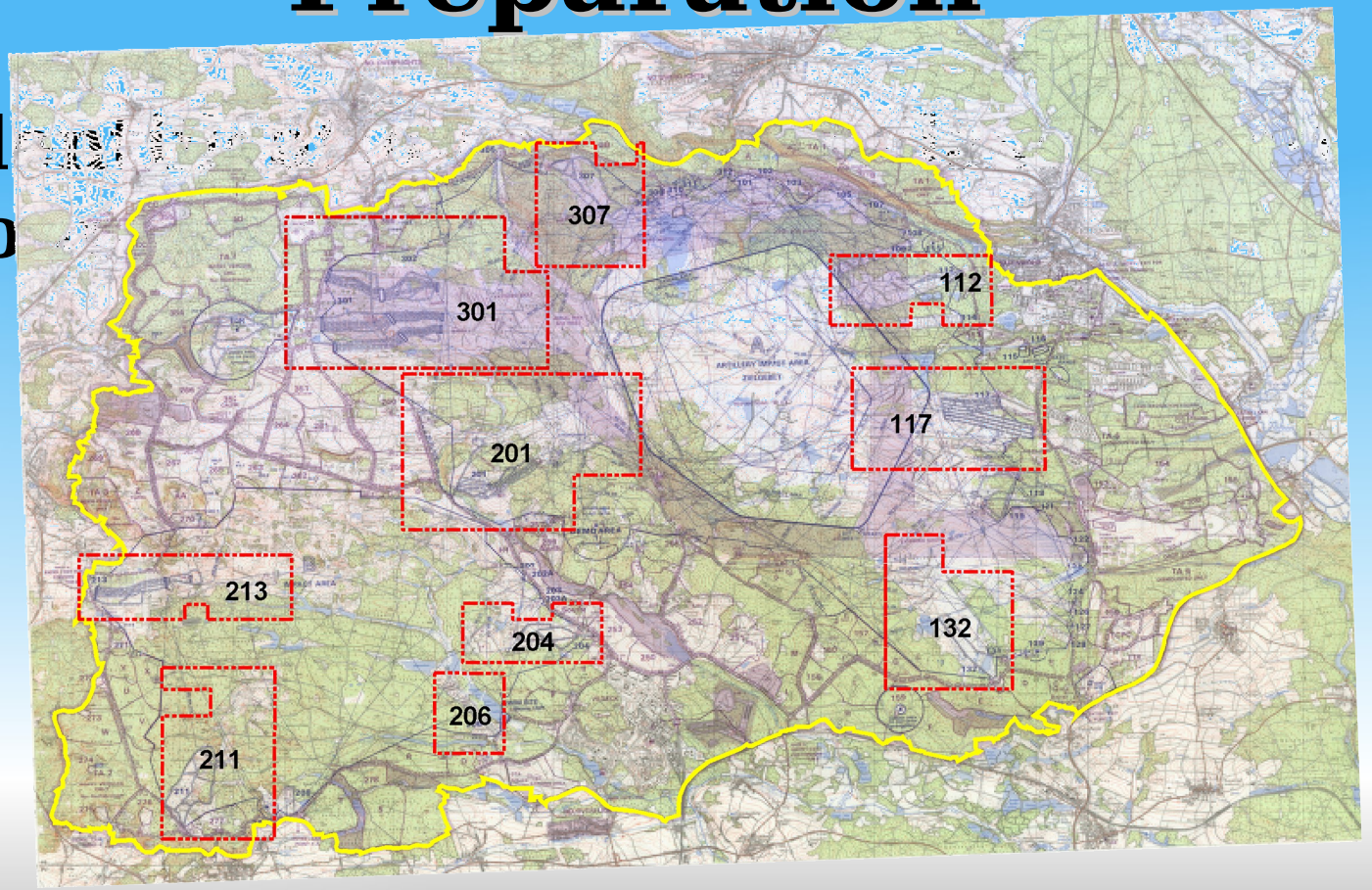
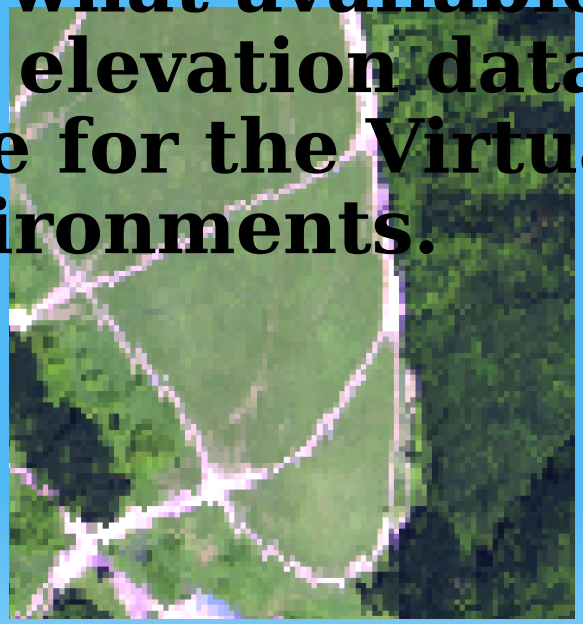


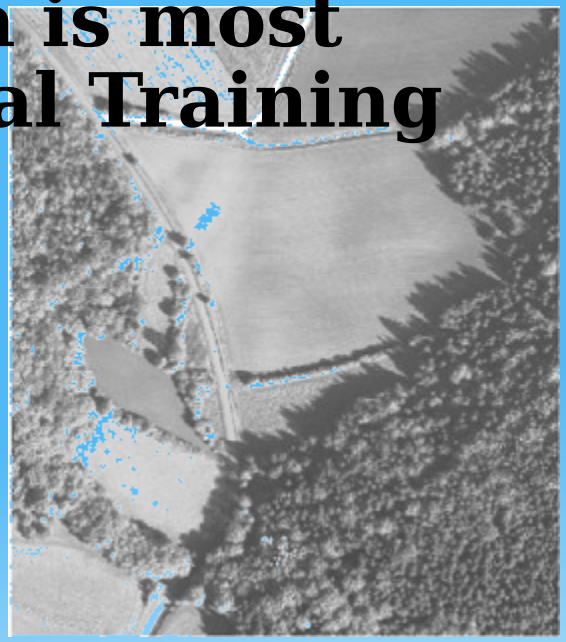
# Task 1: Data Acquisition and Preparation

- **Determine what available imagery and digital elevation data is most appropriate for the Virtual Training Range Environments.**

HRSC-A Data



HyMap Data



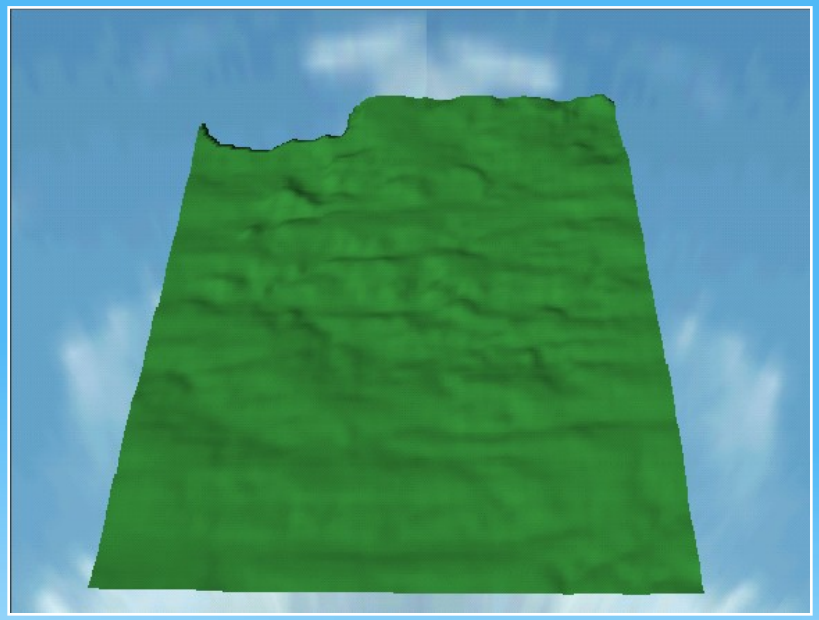
Panchromatic Data

# Task 2: Creation of Virtual Training Range Environments

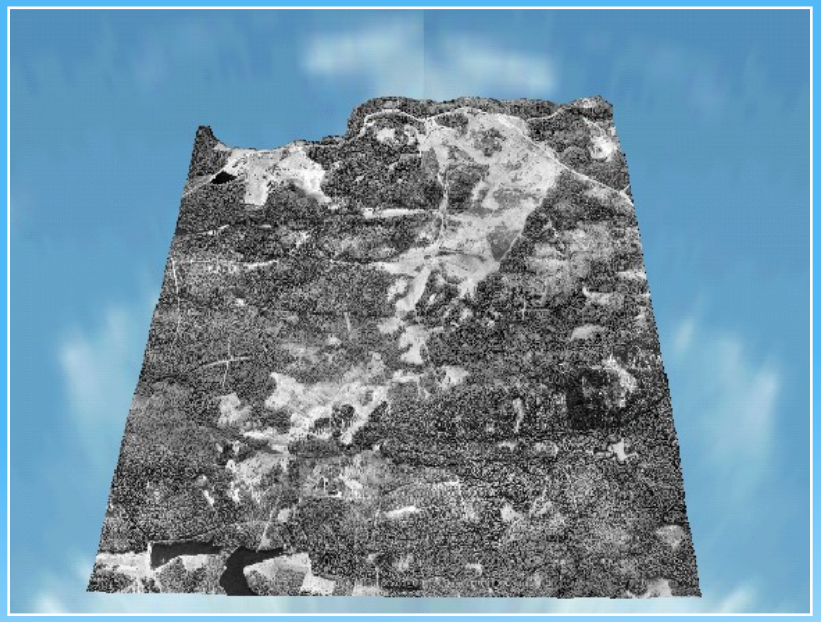
- ERDAS Imagine Virtual GIS module
  - Two base data layers
    - Digital Imagery
    - Digital Elevation Model
  - Multiple model layers
    - Vegetation
    - Firing Points/Battle Positions
    - Targets
  - Vehicle Maneuver Path

# ERDAS Imagine Virtual GIS (VGIS) Module

## Two Base Data Layers

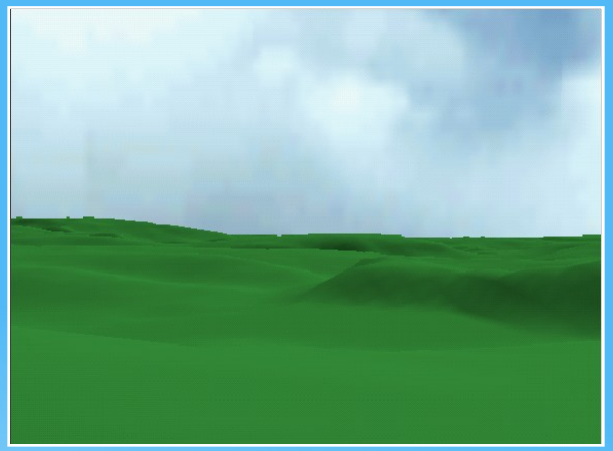


Digital Elevation Model

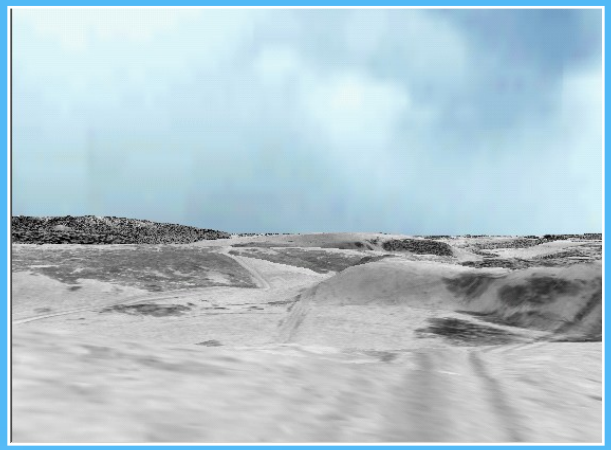


Aerial Imagery

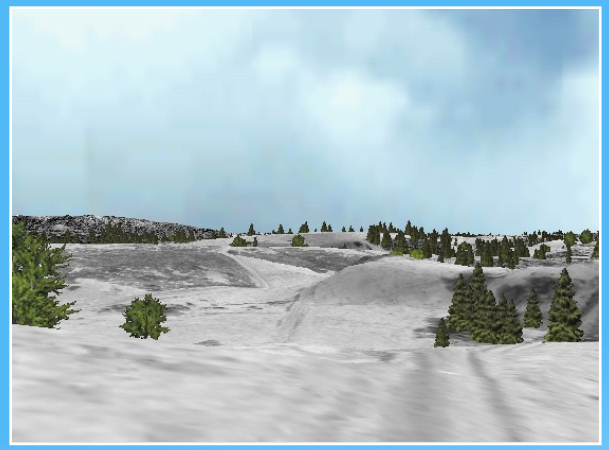
# ERDAS Imagine Virtual GIS (VGIS) Module



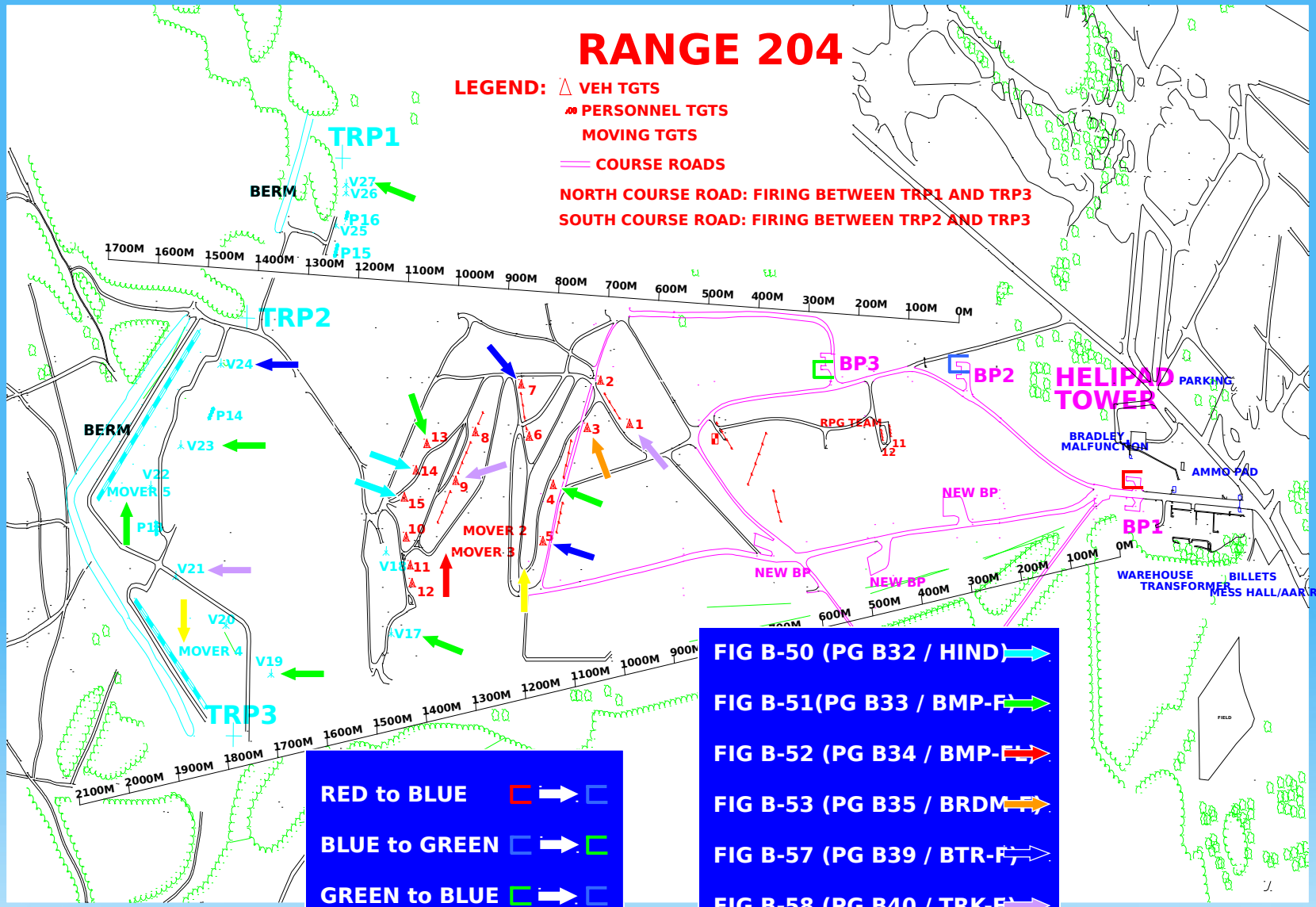
Digital Elevation Model



Aerial Imagery

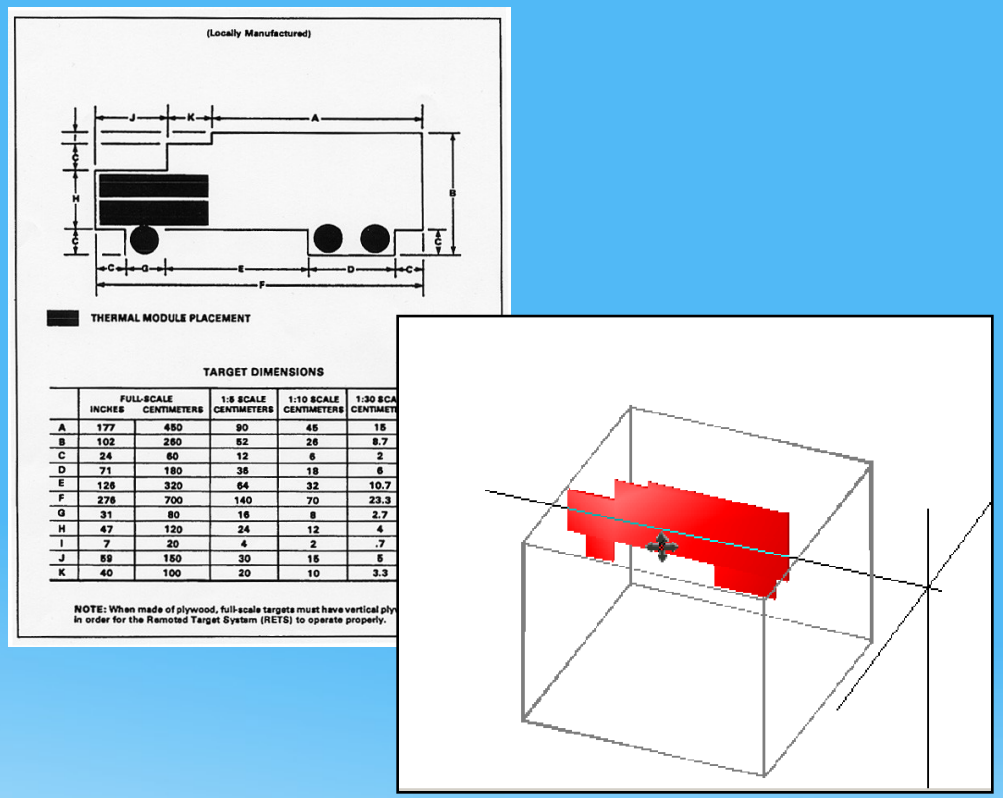


Vegetation Model


RANGE 204
LEGEND:
VEH TGTS
PERSONNEL TGTS
MOVING TGTS
COURSE ROADS
NORTH COURSE ROAD: FIRING BETWEEN TRP1 AND TRP3
SOUTH COURSE ROAD: FIRING BETWEEN TRP2 AND TRP3
TRP1
TRP2
TRP3
BERM
BERM
V27
V26
P16
V25
P15
V24
P14
V23
V22
MOVER 5
P13
V21
V20
MOVER 4
V19
V18
V17
MOVER 2
MOVER 3
BP3
BP2
BP1
HELIPAD
TOWER
PARKING
RPG TEAM
BRADLEY MALFUNCTION
AMMO PAD
NEW BP
NEW BP
NEW BP
WAREHOUSE
TRANSFORMER
BILLETS
MESS HALL/AAR ROOMS
1700M 1600M 1500M 1400M 1300M 1200M 1100M 1000M 900M 800M 700M 600M 500M 400M 300M 200M 100M 0M
2100M 2000M 1900M 1800M 1700M 1600M 1500M 1400M 1300M 1200M 1100M 1000M 900M
0M 100M 200M 300M 400M 500M 600M
RED to BLUE
BLUE to GREEN
GREEN to BLUE
BLUE to RED
RED (Stop)
FIG B-50 (PG B32 / HIND)
FIG B-51(PG B33 / BMP-F)
FIG B-52 (PG B34 / BMP-F)
FIG B-53 (PG B35 / BRDM-F)
FIG B-57 (PG B39 / BTR-F)
FIG B-58 (PG B40 / TRK-F)
FIG B-59 (PG B41 / TRK-F)
TROOPs EMPLACED (5-7)

# ERDAS Imagine Virtual GIS (VGIS) Module

# ERDAS Imagine Virtual GIS (VGIS) Module


(Locally Manufactured)

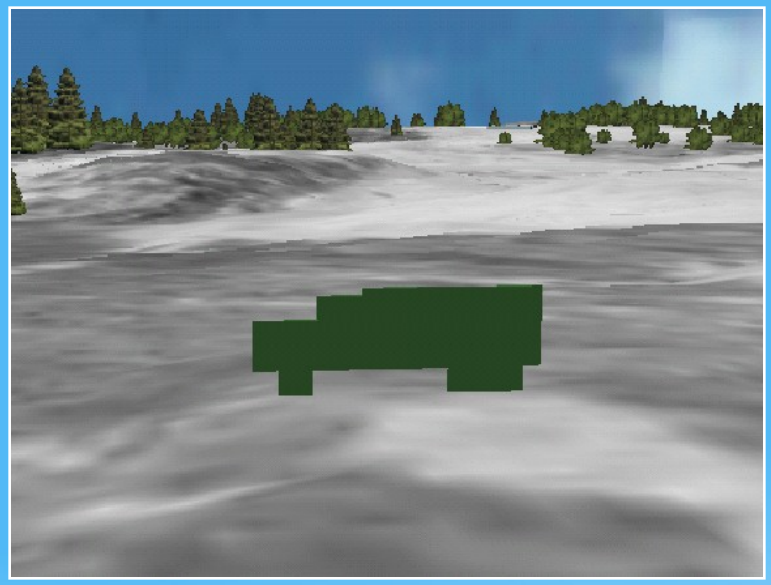
THERMAL MODULE PLACEMENT

TARGET DIMENSIONS

| | FULL-SCALE INCHES | FULL-SCALE CENTIMETERS | 1:5 SCALE CENTIMETERS | 1:10 SCALE CENTIMETERS | 1:30 SCA CENTIMET |
|---|---|---|---|---|---|
| A | 177 | 450 | 90 | 45 | 15 |
| B | 102 | 260 | 52 | 26 | 8.7 |
| C | 24 | 60 | 12 | 6 | 2 |
| D | 71 | 180 | 36 | 18 | 6 |
| E | 126 | 320 | 64 | 32 | 10.7 |
| F | 276 | 700 | 140 | 70 | 23.3 |
| G | 31 | 80 | 16 | 8 | 2.7 |
| H | 47 | 120 | 24 | 12 | 4 |
| I | 7 | 20 | 4 | 2 | .7 |
| J | 59 | 150 | 30 | 15 | 5 |
| K | 40 | 100 | 20 | 10 | 3.3 |

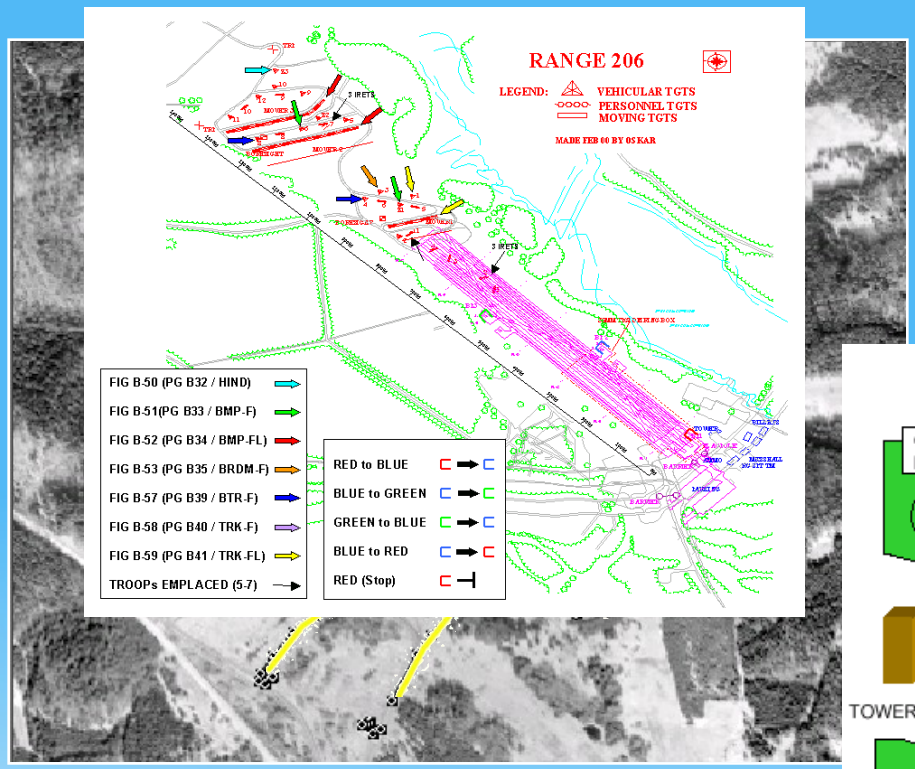
NOTE: When made of plywood, full-scale targets must have vertical ply
in order for the Remoted Target System (RETS) to operate properly.

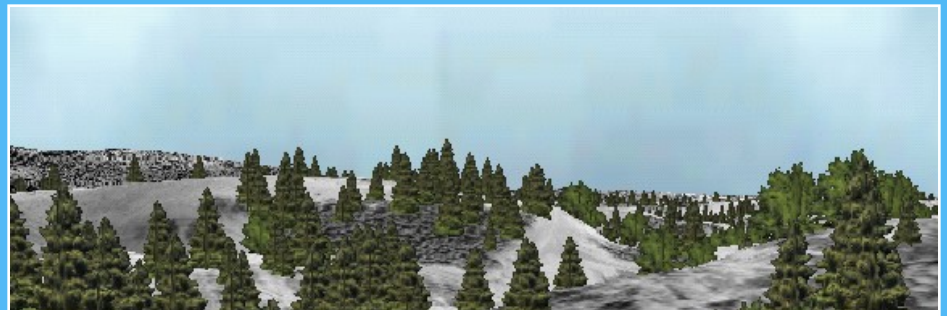


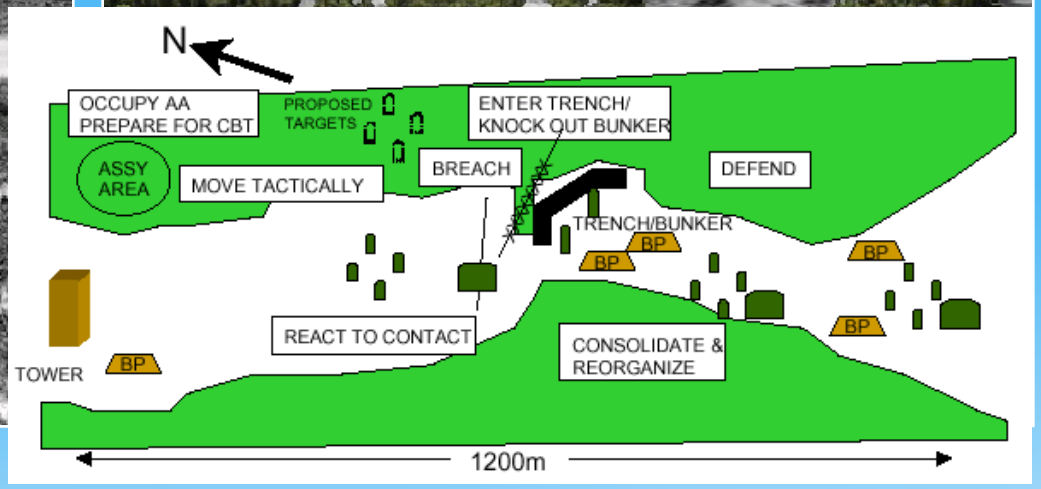


Creation of 3D Target Models

# ERDAS Imagine Virtual GIS (VGIS) Module

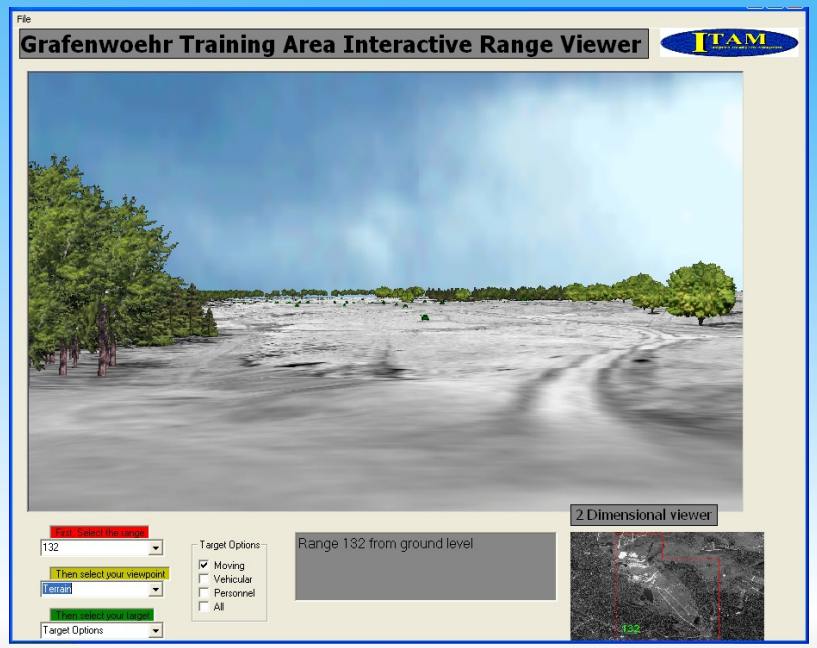


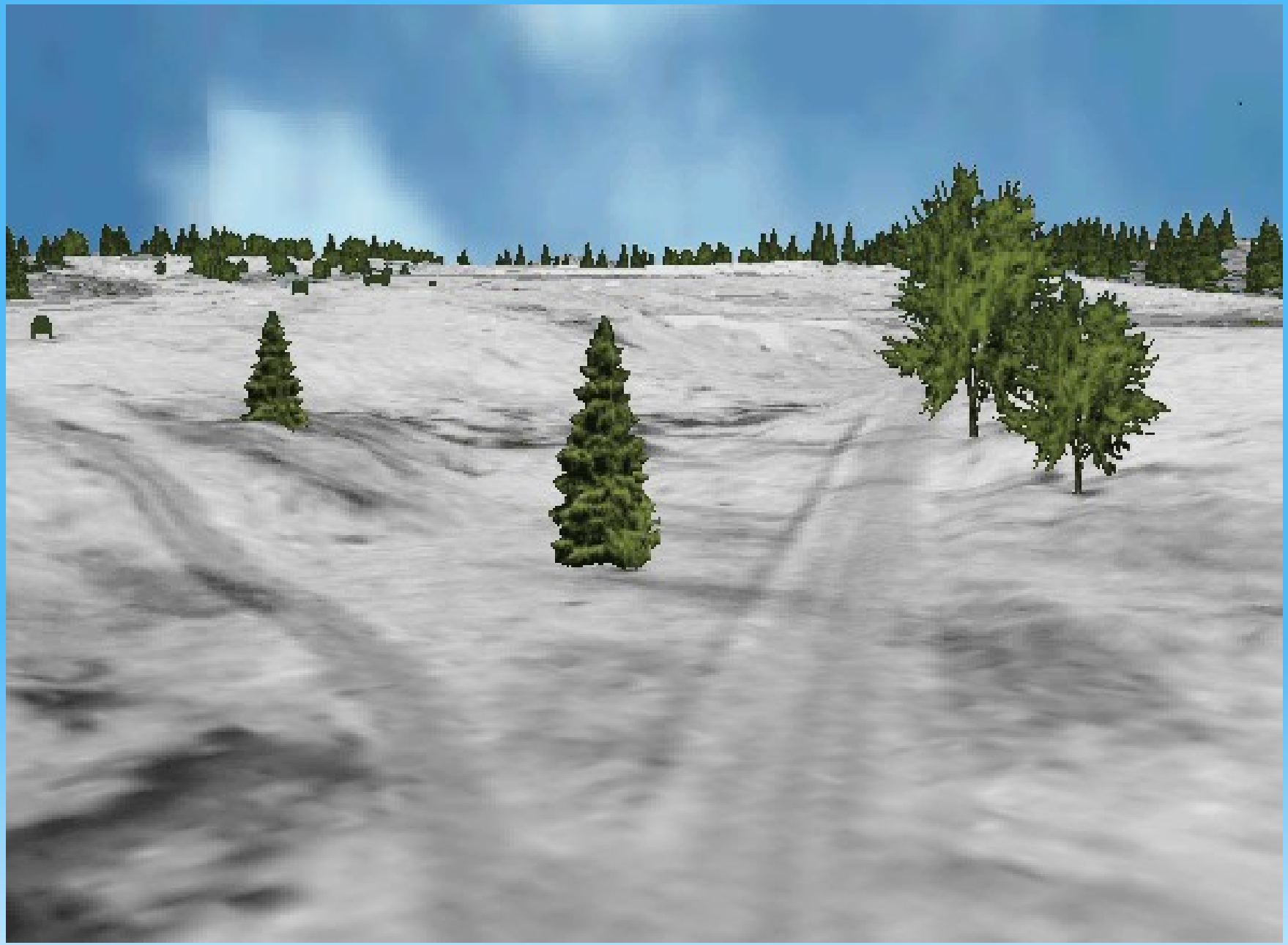



Digitize Vehicle Maneuver Path

# Task 3: Creation of the Graphical User Interface (GUI)




- Navigate through the application via pull down menus and action buttons
- View various targeting options
- Vital Information Display



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# Task 4: Report Preparation/User Manual

- **Report Preparation:**
  - **Document specifics about the data used in the Virtual Training Range Environments**
- **User Manual contents:**
  - **Description of the application**
  - **Summary of the data used in the application**
  - **User's guide**

# Lessons Learned at USAREUR

- **ERDAS Imagine VGIS Module is extremely flexible**
- **DXF model format is very easy to use with VGIS**
- **Improved model design makes for a better visual presentation**
- **Use of color imagery would improve end product**
- **Quality of final product highly dependant on quality of base data layers**

# Summary

- **Development of VB Graphical User Interface for viewshed analysis and 3D visualization. This interface can be used by range managers for planning purposes and troops for training purposes.**

- **Stages of Development:**
  - **Data acquisition and preparation**
  - **VGIS development**
  - **Visual Basic based interface development**
  - **Report preparation and User manual creation**

- **Lessons Learned**

**Bethany Hodge or Steven Shumaker**
**Pangaea Information Technologies, Ltd.**
**14 E. Jackson Blvd., Suite 1325**
**Chicago, IL 60604**
**USA**
**Tel. 312-986-9471**
**Fax. 312-986-9477**
**Email sshumaker@pangaeatech.com**
**www.pangaeatech.com**